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ABSTRACT

An analytic system for determining student flow in different subject fields in order to produce departmental workload forecasts is examined. The system consists of three steps. The first step, student flow calculation, computes the relationship of enrollments by major and student level from one year to another. This calculation utilizes historical enrollment trends and a simple flow technique to develop the probability of a student with a given major and student level being in another major/student level in the next year. The second step is the construction of a historical curriculum matrix, which describes in credit hours the relationship between students majoring in various degree programs and the departments from which they draw instructional services. The third and final step of the system combines the outputs of the first two steps to produce departmental workload forecasts. Potential uses of the data include: determining what majors and what levels of students are taking courses offered by a department, determining which majors and student levels within student majors have higher or lower attrition rates, and financial planning. Four sample output reports and examples of calculating transition percentages from historical data are presented. (SW)

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STUDENT FLOW AND CURRICULUM MATRIX

by

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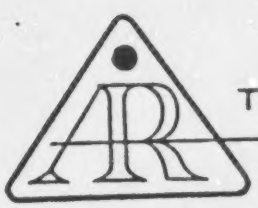

THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

This paper was presented at the Twenty-Third Annual Forum of the Association for Institutional Research held at the Sheraton Centre in Toronto, Ontario, May 23-26, 1983. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

D. R. Coleman, Chairman
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CONCEPTUAL OVERVIEW

EXECUTIVE SUMMARY

The analytic system described in this document is designed to allow academic administrators to address questions of the following type:

1. What is the likely departmental workload that will occur next autumn for upper division undergraduate courses in English?

2. What is the probability that a junior majoring in Accounting this fall will be a senior in Accounting next fall? What is the probability of that student shifting to Marketing?

3. What are the comparative retention/attrition rates for students of various majors?

4. What is the credit hour impact of advanced undergraduate Physics majors on the Math Department as well as on other departments?

The system consists of three steps. The first step, Student Flow Calculation, computes the relationship of enrollments by major and student level from one year to another. This calculation utilizes historical enrollment trends and a simple flow technique to develop the probability of a student with a given major and student level being in another major/student level in the next year.

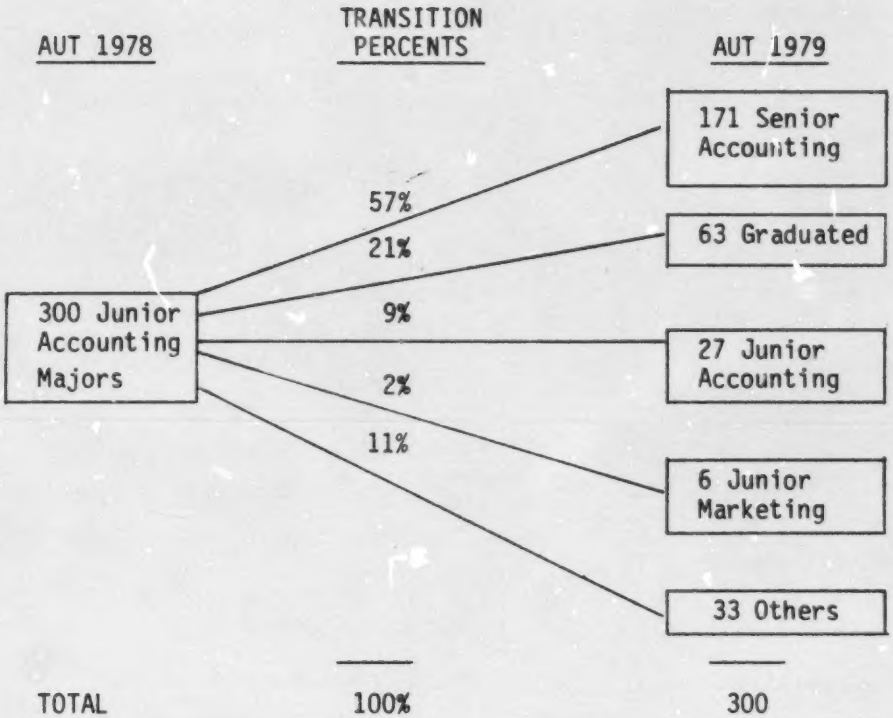
The second step is the construction of a historical Curriculum Matrix (CM). This matrix describes, in credit hours, the relationship between students majoring in various degree programs and the departments from which they draw instructional services.

The third and final step of the system combines the outputs of the first two steps to produce Departmental Workload Forecasts. The remainder of this Executive Summary discusses each component of the system.

A. STUDENT FLOW CALCULATION

The student flow calculation computes the percentage of students of a given major and rank in one period who end up with a given major and rank in a subsequent period. For example, what percentage of junior Accounting majors in Autumn Quarter 1978, were enrolled as senior Accounting majors in Autumn Quarter 1979; what percentage graduated; what percentage remained junior accounting majors, etc.? Figure 1 is a display of student flow transitions.

FIGURE 1



B. CURRICULUM MATRIX:

A Curriculum Matrix can be one of two types of reports. The first report is Credit Hours Taken, which is organized by student major. It shows the average number of credit hours taken by each student major from each instructional department. The second report is Credit Hours Taught which is organized by department and shows the average number of credit hours taught by each department to each student major. Figure 2 is a simplified Credit Hours Taken Curriculum Matrix:

FIGURE 2

CURRICULUM MATRIX

Average Number of Credit Hours Taken by Majors in:

	HIST	ENGLISH	MATH
PSYCH	3.5	1.0	1.0
HIST	6.0	3.0	3.0
ENGL	3.0	6.0	3.0
MATH	2.5	3.0	6.0
TOTAL	15.0	13.0	13.0

This Curriculum Matrix shows that History Majors take, on the average, 3.5 credit hours from the Psychology Department; 6.0 credit hours from the History Department; 3.0 credit hours from the English Department and 2.5 credit hours from the Math Department.

C. DEPARTMENTAL WORKLOADS:

Projection of departmental workloads is obtained by first projecting enrollments in the various student major categories. This projection can be made by using the student flow transitions computed in Step A. These projected enrollment data are then multiplied by the proper curriculum matrix elements to give projected departmental workloads. For example, suppose the student flow calculations are used to project that the University will enroll 300 History majors, 200 English majors and 100 Math majors. Multiplying the columns of the sample curriculum matrix, displayed in Figure 2 by 300, 200, and 100, respectively, produces the workload matrix shown in Figure 3.

FIGURE 3

PROJECTED WORKLOAD MATRIX

MAJOR / DEPT	HIST	ENGLISH	MATH	TOTAL PROJECTED DEPT. WORKLOAD
PSYCH	1,050	200	100	1,350
HIST	1,800	600	300	2,700
ENGL	900	1,200	300	2,400
MATH	750	600	600	1,950
TOTAL	4,500	2,600	1,300	8,400

Thus, the projected total departmental workload, based on the sample historical curriculum matrix in Figures 2 and sample projected student majors of 300, 200, and 100 headcount students in History, English and Math respectively, produces 1,350 credit hours in the Psychology Department. (3.5 x 300 + 1.0 x 200 + 1.0 x 100). Similar calculations produce projected workload of 2,700 credit hours in the History Department; 2,400 credit hours in the English Department; and 1,950 credit hours in the Math Department. Projected total University workload is 8,400 student credit hours.

D. USES OF THE DATA:

The Credit Hours Taken Report (See Figures 2, and 8) of the curriculum matrix can be used by a dean or department chairperson to determine in which departments, and at what course levels his/her majors are taking courses. Are upper division students taking an unexpectedly large number of credit hours in lower division courses? Are students taking a large number of credit hours in unexpected disciplines? If so, perhaps the department or college is not offering a broad enough array of courses. The Curriculum Matrix can be used to estimate the effect of planned curricular changes on departments. For example, the effect on the Foreign Languages Department of a new language requirement for Physics majors can be estimated. Likewise, the effect on the Foreign Languages Department of expected increases in headcount Engineering majors or decreases in Education majors can be determined.

A Credit Hours Taught Report (See Figure 9) can be used to determine what majors and what levels of students are taking courses offered by a department. Typical questions include: Are an unexpectedly large number of lower division students taking upper division courses or vice versa? Are students of unexpected majors taking credit hours taught by the departments? Are non-majors taking courses intended primarily or exclusively for majors? Different course consumption patterns of male versus female students can be determined by producing the curriculum matrix first with only male students included and then with only female students. In fact, any variable may be substituted for the student major/student level, department/course level categories traditionally shown in the curriculum matrix.

The Transition Probabilities (See Figure 6) from the student flow calculation have substantial utility also. For example, by running the student flow calculation "backwards" a retention study can be conducted. A backwards run is constructed by designating the more recent term, the "from" term, and the more distant term the "to" term. In this configuration students who are not enrolled in the more recent term, but who were enrolled in the more distant term are defined as exiting students. In this mode one can determine which student majors and student levels within student majors have higher or lower attrition rates. Transition probabilities for several years can be compared from like term to like term in order to highlight trends in student major changes. For example, if students are switching out of the department's majors into other degree programs, further analysis could be conducted to determine the reason and take necessary corrective action where appropriate.

This data can also be used for financial planning. If productivity ratios (average credit hours produced per FTE faculty member) are known, staffing levels can be projected by department then multiplied by average salary to project departmental faculty salary needs. Other components of departmental expenditures can be projected as a function either of credit hours, headcount students, FTE faculty or headcount faculty, or student credit hours.

The above applications are illustrative and not intended to be exhaustive of potential uses. Undoubtedly, each institution and users within each institution will find new and creative uses of the data and utility. Indeed, mere perusal of the reports and attempts to explain unexpected relationships are sufficient to justify the exercise.

CONCEPTUAL BASE AND SAMPLE CALCULATIONS

A. CONCEPTUAL BASE:

The underlying conceptual framework for this Student Flow System is the Markov Process. The Markov model was chosen because of its conceptual simplicity and because among all the curve fitting methods for projecting student enrollments (See Wing, 1974) it best replicates the real world student flow process. A Markov process is a stochastic process in which the transition probabilities depend upon the preceeding state or event. As applied to university student flow modeling this means simply that the probability of a student becoming a senior accounting major next autumn quarter is conditional on his/her student major/level state in the current autumn quarter. These probabilities are estimated from his/her state in the previous autumn quarter, etc. Transition probabilities in the Markov process are calculated from each individual student rather than by groups of students.

Implicitly, since the model relies on historical data it assumes that future transition rates will be similar to past transition rates at least through the time period being forecast. If the future were always like the past, however, there would be no need for planners and forecasters or for the system described in this document. Ample provision, therefore, has been made for modification of historically generated transition probabilities to reflect anticipated future changes in curricular requirements, student preferences, etc.

B. SAMPLE CALCULATION

This section describes the processing flow of individual student records required to produce projected departmental workloads. Historical transition probabilities are calculated from individual student records and are then multiplied by the most recent term's headcounts. The results are projected headcount majors which are multiplied through the columns of the historical or projected headcount Curriculum Matrix producing a projected Instructional Work Load Matrix (IWLM). The row totals of the IWLM are the projected departmental student credit hour workloads. The following sample calculation will make this process more clear.

The first step is to calculate historical transition probabilities from individual student records from two semesters or terms. The calculation follows a two-step process, as illustrated in Figure 4. The first step is to build a headcount matrix that simply counts the number of students in each transition category. For example, the number of students in major A in 1978 who were in major B in 1977; the number of students in major A in 1978 that were not enrolled in 1977; or the number of students in major A in 1977 who were not enrolled in 1978. The second step is to divide the headcounts by the column totals to estimate the transition percentages (or

probabilities). Notice that this calculation gives transition rate estimates for exiting students and a prediction of the distribution of entering students as well as an estimate of the flow percentages between majors.

The next step of the calculations is to use these transition rates as a predictor of future enrollments. This process is illustrated in Figure 5. The most recent year's enrollment is used along with an estimate of the number of new students expected. These are multiplied by the transition percentages from Figure 4 to produce an estimate of the headcount enrollment by major. Thus, projected fall 1979 type A major headcount is 870 (900 x .4 + 1,000 x .1 + 1,000 x .1 + 1,100 x .1 + 1,000 x .2).

FIGURE 4
CALCULATION OF TRANSITION PERCENTAGES
FROM HISTORICAL DATA

HEADCOUNT MATRIX OF STUDENTS IN TWO TIME PERIODS:

		FALL 1977					
		MAJOR A	MAJOR B	MAJOR C	MAJOR D	ENTERING STUDENTS NOT ENROLLED 1977)	STUDENTS
FALL 1978	MAJOR A	400	100	100	100	200	900
	MAJOR B	100	400	100	150	250	1,000
	MAJOR C	200	150	350	100	200	1,000
	MAJOR D	50	150	200	350	350	1,100
	EXITING STUDENTS (NOT ENROLLED IN 1978)	250	200	250	300		1,000
	TOTAL 1977 STUDENTS	1,000	1,000	1,000	1,000	1,000	

FIGURE 4 (CONTINUED)
CALCULATION OF TRANSITION PERCENTAGES
FROM HISTORICAL DATA

TRANSITIONAL PROBABILITY MATRIX,
(HEADCOUNT MATRIX DIVIDED
BY COLUMN TOTALS):

	MAJOR A	MAJOR B	MAJOR C	MAJOR D	ENTERING STUDENTS
MAJOR A	.40	.10	.10	.10	.20
MAJOR B	.10	.40	.10	.15	.25
MAJOR C	.20	.15	.35	.10	.20
MAJOR D	.05	.15	.20	.35	.35
EXITING STUDENTS	.25	.20	.25	.30	

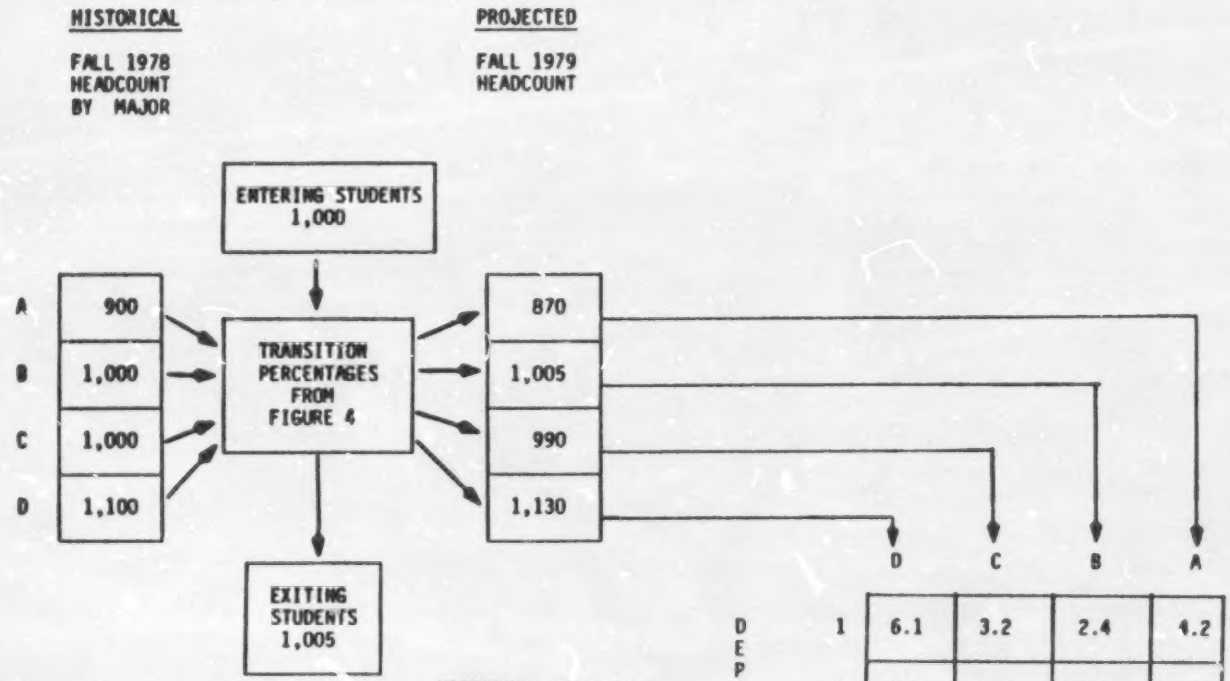
These projected headcount majors are then multiplied through the columns of the curriculum matrix, producing an Instruction Work Load Matrix (IWLM). The Autumn 1978 historical curriculum matrix (Figure 5) shows in Autumn 1978 that the average Type A headcount major took 4.2 credit hours from department 1. Since we project 870 Autumn 1979 Type A headcount majors, we project the resulting workload induced on Department 1 will be 3,654 (870 x 4.2). Similarly, the 1,005 projected Type B majors will take, on the average, 2.4 credit hours from department 1, resulting in 2,412 projected credit hours. Similar calculations for all cells of the curriculum matrix complete the instructional workload matrix shown in Figure 5.

Finally, by summing the rows of the IWLM, we obtain projected Autumn 1979 departmental workloads and credit hours. In the sample calculation, projected credit hours are:

1. 16,127
2. 15,848
3. 14,227
4. 13,848

FIGURE 5

SAMPLE CALCULATION OF DEPARTMENT WORKLOADS



HISTORICAL FALL 1978

CURRICULUM MATRIX

DEPARTMENTS	D	C	B	A
1	6.1	3.2	2.4	4.2
2	4.3	4.5	2.0	5.2
3	2.6	5.7	3.8	2.1
4	3.0	1.6	5.8	3.5

16.0 15.0 14.0 15.0

PROJECTED AUTUMN

1979 INSTRUCTIONAL WORKLOAD

MATRIX

DEPARTMENTS					PROJECTED AUTUMN 1979 DEPARTMENTAL WORKLOAD
1	6893	3168	2412	3654	16,127
2	4859	4455	2010	4524	15,848
3	2938	5643	3819	1827	14,227
4	3390	1584	5829	3045	13,848

BUDGET PROCESS & DEPARTMENTAL PLANNING

SAMPLE REPORTS

This section contains sample output reports for:

A. The transition probability matrix of the Student Flow Model (Figure 6);

B. The projected headcount enrollments report of the Student Flow Model (Figure 7);

C. A Curriculum Matrix Credit Hours Taken Report (Figure 8);

D. A Curriculum Matrix Credit Hours Taught Report (Figure 9).

A. HISTORICAL TRANSITION REPORT - Figure 6

1 indicates the sending and receiving time periods. In this case the flow of students is from "sending" Autumn 1977 to "receiving" Autumn 1978. **2** is the sending major code (06). **3** is the sending major name (Math and Physical Sciences). **4** indicates the level code of student majors for the Autumn 1977 sending term (3-Jr.) **5** is the number of Math and Physical Science juniors, Autumn 1977 who became senior Math and Physical Science majors by Autumn 1978. **6** 67 is 53.17% of 126. This is the "flow" or transition probability. The value .5317 will be used later to project the flow of Autumn 1978 junior level Math and Physical Science majors to Autumn 1979 senior level Math and Physical Science majors. **7** is the cumulative transition probability through this row of the printout. **8** indicates the total number of junior level Math and Physical Science majors Autumn Quarter 1977.

B. PROJECTED HEADCOUNT ENROLLMENTS - Figure 7

9 indicates the major level state being projected. In this case major 06 equals Math and Physical Sciences. The student level being projected is rank 4 which is senior.**10** indicates the major level states from which students will transit in the sending term. **11** indicates that there were 129 junior Math and Physical Science students in Autumn 1978. **12** indicates that 53.17% of the 129 junior Math and Physical Science majors in Autumn Quarter of 1978 are projected to transit to senior Math and Physical Science majors in Autumn Quarter 1979 producing **13** 68.5893 of the 150.7974 projected Autumn 1979 Math and Physical Sciences senior headcount enrollments will come from prior year's junior Math and Physical Sciences headcount enrollments. **14** isthe total projected headcount enrollment for Autumn Quarter 1979 senior level Math and Physical Science majors (150).

CURRICULUM MATRIX

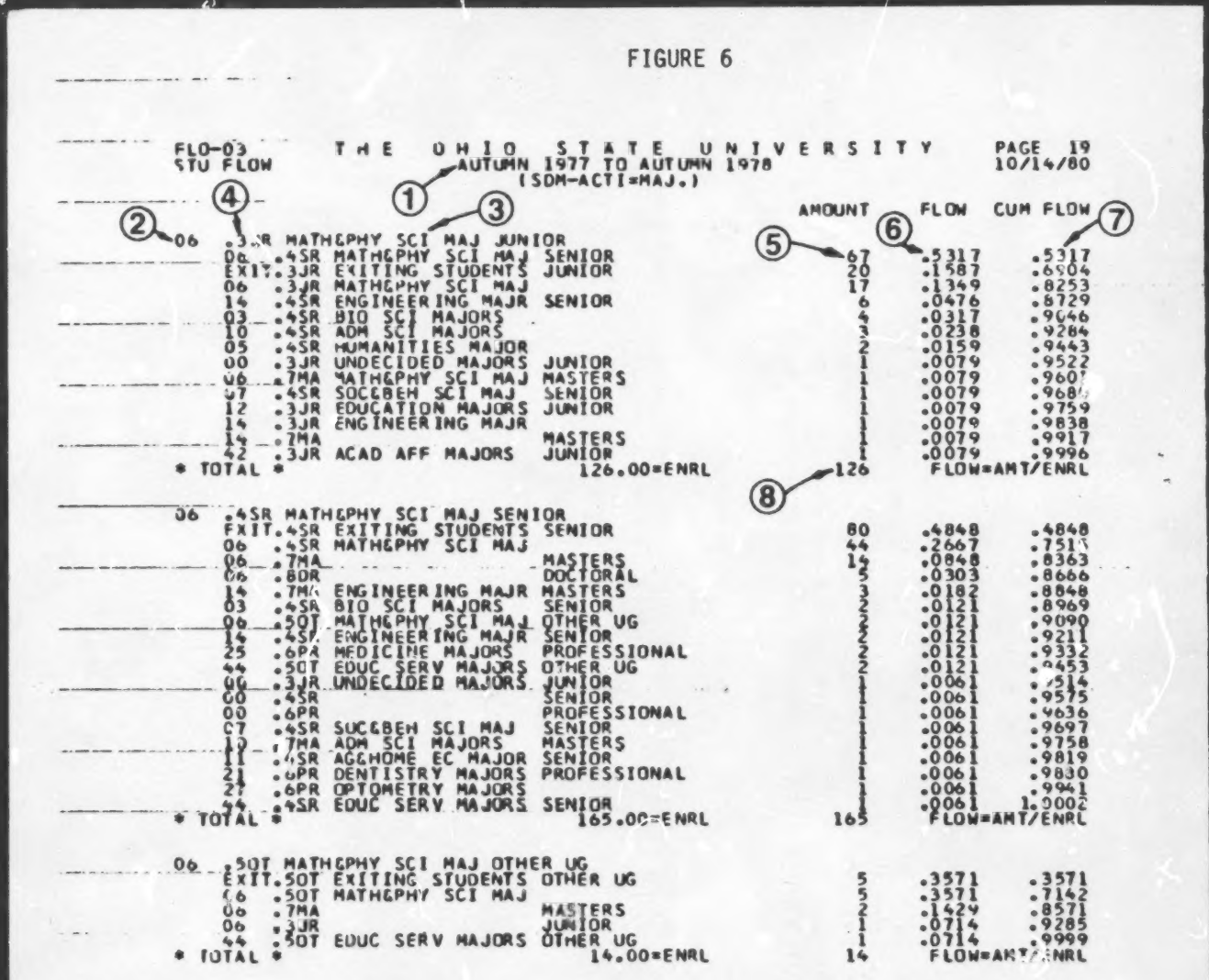
CREDIT HOURS TAKEN REPORT - Figure 8

15 indicates this printout is an ICLM or Curriculum Matrix Report. **16** is the student major code. **17** is the student major name. **18** is the code for the department offering the course. **19** is the name of the department offering the course. **20** is the number of credit hours taken by Economics students in each department. **21** is the percentage of all credit hours taken by Economics students in courses offered by each department. **22** is the cumulative percent of credit hours taken by Economics students. **23** is the total number of credit hours taken by Economics students. **24** indicates this is a Credit Hours Taken Report (i.e., student major to discipline).

CREDIT HOURS TAUGHT REPORT - Figure 9

25 indicates this printout is an ICLM or CM report **26** indicates this is a Credit Hours Taught Report (i.e., discipline to student major). **27** is the code for the department offering the courses. **28** is the name of the department offering the course. **29** are the codes for the student majors taking the courses. **30** are the names of the majors taking the courses. **31** is the number of credit hours taken by each major in Entomology courses. **32** is the percentage of credit hours taken by the various majors in Entomology courses. **33** is the cumulative percentage. **34** is the total number of credit hours taught in the Entomology Department.

FIGURE 6



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FLO-03          T H E   O H I O   S T A T E   U N I V E R S I T Y          PAGE  19
STU FLOW          AUTUMN 1977 TO AUTUMN 1978                             10/14/80
                        (SDM-ACTI=MAJ.)

                                                          AMOUNT    FLOW   CUM FLOW
  06   .3JR MATH&PHY SCI MAJ JUNIOR
  06   .4SR MATH&PHY SCI MAJ SENIOR                           67   .5317     .5317
  EXIT.3JR EXITING STUDENTS JUNIOR                          20   .1587     .6904
  06   .3JR MATH&PHY SCI MAJ                                17   .1349     .8253
  14   .4SR ENGINEERING MAJR SENIOR                          6   .0476     .8729
  03   .4SR BIO SCI MAJORS                                   4   .0317     .9046
  10   .4SR ADM SCI MAJORS                                   3   .0238     .9284
  05   .4SR HUMANITIES MAJOR                                 2   .0159     .9443
  00   .3JR UNDECIDED MAJORS  JUNIOR                         1   .0079     .9522
  06   .7MA MATH&PHY SCI MAJ  MASTERS                        1   .0079     .9601
  07   .4SR SOC&BEH SCI MAJ   SENIOR                        1   .0079     .9680
  12   .3JR EDUCATION MAJORS  JUNIOR                        1   .0079     .9759
  14   .3JR ENGINEERING MAJR                                1   .0079     .9838
  14   .7MA                   MASTERS                       1   .0079     .9917
  42   .3JR ACAD AFF MAJORS   JUNIOR                        1   .0079     .9996
* TOTAL *                                126.00=ENRL        126    FLOW=AMT/ENRL

  06   .4SR MATH&PHY SCI MAJ SENIOR
  EXIT.4SR EXITING STUDENTS SENIOR                         80   .4848     .4848
  06   .4SR MATH&PHY SCI MAJ                               44   .2667     .7515
  06   .7MA                   MASTERS                      14   .0848     .8363
  06   .8DR                   DOCTORAL                      5   .0303     .8666
  14   .7MA ENGINEERING MAJR  MASTERS                       3   .0182     .8848
  03   .4SR BIO SCI MAJORS    SENIOR                        2   .0121     .8969
  06   .5OT MATH&PHY SCI MAJ  OTHER UG                      2   .0121     .9090
  14   .4SR ENGINEERING MAJR  SENIOR                        2   .0121     .9211
  25   .6PR MEDICINE MAJORS   PROFESSIONAL                  2   .0121     .9332
  44   .5OT EDUC SERV MAJORS  OTHER UG                      2   .0121     .9453
  00   .3JR UNDECIDED MAJORS  JUNIOR                        1   .0061     .9514
  00   .4SR                   SENIOR                        1   .0061     .9575
  00   .6PR                   PROFESSIONAL                  1   .0061     .9636
  07   .4SR SOC&BEH SCI MAJ   SENIOR                        1   .0061     .9697
  10   .7MA ADM SCI MAJORS    MASTERS                       1   .0061     .9758
  11   .4SR AG&HOME EC MAJOR  SENIOR                        1   .0061     .9819
  21   .6PR DENTISTRY MAJORS  PROFESSIONAL                  1   .0061     .9880
  27   .6PR OPTOMETRY MAJORS                                1   .0061     .9941
  44   .4SR EDUC SERV MAJORS  SENIOR                        1   .0061    1.0002
* TOTAL *                                165.00=ENRL        165    FLOW=AMT/ENRL

  06   .5OT MATH&PHY SCI MAJ OTHER UG
  EXIT.5OT EXITING STUDENTS OTHER UG                        5   .3571     .3571
  06   .5OT MATH&PHY SCI MAJ                                5   .3571     .7142
  06   .7MA                   MASTERS                       2   .1429     .8571
  06   .3JR                   JUNIOR                        1   .0714     .9285
  44   .5OT EDUC SERV MAJORS  OTHER UG                      1   .0714     .9999
* TOTAL *                                14.00=ENRL         14    FLOW=AMT/ENRL
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FIGURE 7

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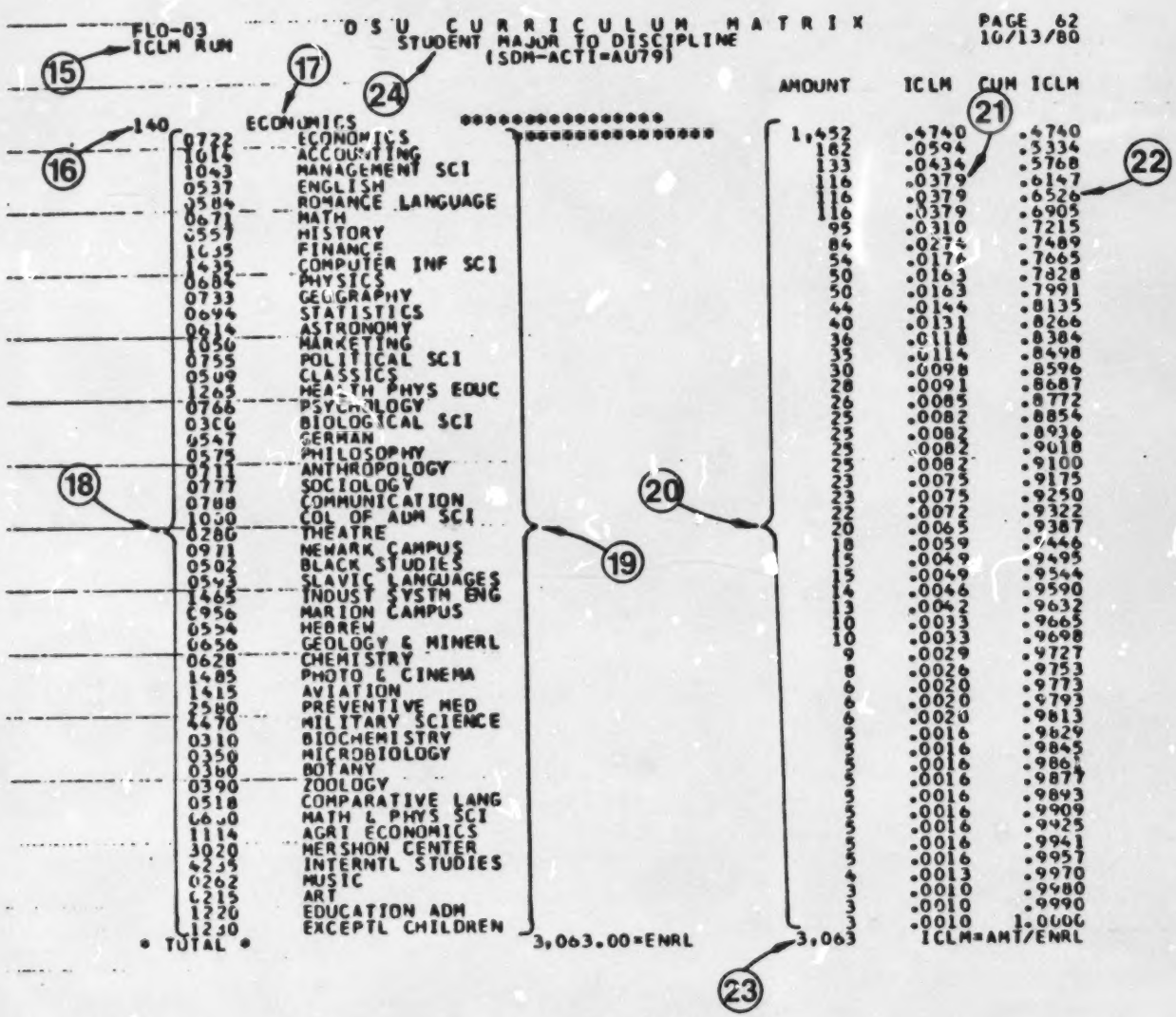
RECEIVING		SENDING	BASE.ENRL.HD	TRANS PROBS	AU79.ENRL.HD
MAJ.06	.3JR	**TOTALS**			124.4790
MAJ.06	.4SR	MAJ.ENTR.4SR	540.0000	.0296	15.9840
		MAJ.00 .LDV	3,353.0000	.0006	2.0118
		MAJ.00 .3JR	816.0000	.0039	3.1824
		MAJ.03 .LDV	185.0000	.0041	.7585
		MAJ.03 .4SR	364.0000	.0072	2.6208
		MAJ.05 .4SR	304.0000	.0031	.9424
		MAJ.06 .LDV	88.0000	.0745	6.5560
		MAJ.06 .3JR	129.0000	.5317	68.5893
		MAJ.06 .4SR	153.0000	.2667	40.8051
		MAJ.07 .4SR	951.0000	.0010	.9510
		MAJ.11 .3JR	1,054.0000	.0009	.9486
		MAJ.12 .3JR	591.0000	.0021	1.2411
		MAJ.14 .LDV	1,059.0000	.0010	1.0590
		MAJ.14 .3JR	994.0000	.0021	2.0874
		MAJ.18 .3JR	130.0000	.0078	1.0140
		MAJ.64 .LDV	2,710.0000	.0004	1.0840
		MAJ.66 .3JR	26.0000	.0370	.9620
MAJ.06	.4SR	**TOTALS**			150.7974
MAJ.06	.5OT	MAJ.ENTR.5OT	2,661.0000	.0026	6.9186
		MAJ.03 .4SR	364.0000	.0024	.8736
		MAJ.06 .4SR	153.0000	.0121	1.8513
		MAJ.06 .5OT	15.0000	.3571	5.3565
MAJ.06	.5OT	**TOTALS**			15.0000
MAJ.06	.6PR	MAJ.ENTR.6PR	652.0000	.0015	.9780
		MAJ.06 .LDV	88.0000	.0106	.9328
		MAJ.06 .6PR	6.0000	.8000	4.8000
MAJ.06	.6PR	**TOTALS**			6.7108
MAJ.06	.7MA	MAJ.ENTR.7MA	2,970.0000	.0377	111.9690
		MAJ.00 .5OT	786.0000	.0014	1.1004
		MAJ.03 .4SR	364.0000	.0024	.8736
		MAJ.03 .7MA	115.0000	.0082	.9430
		MAJ.06 .LDV	88.0000	.0106	.9328
		MAJ.06 .3JR	129.0000	.0079	1.0191
		MAJ.06 .4SR	153.0000	.0848	12.9744
		MAJ.06 .5OT	15.0000	.1429	2.1435
		MAJ.06 .7MA	187.0000	.2488	46.5256
		MAJ.06 .8DR	533.0000	.0039	2.0787
		MAJ.12 .3JR	591.0000	.0011	.6501
		MAJ.44 .5OT	1,588.0000	.0006	.9528
MAJ.06	.7MA	**TOTALS**			182.1630
MAJ.06	.8DR	MAJ.ENTR.8DR	1,329.0000	.0948	125.9892

(9) (10) (11) (12) (13) (14)

FIGURE 8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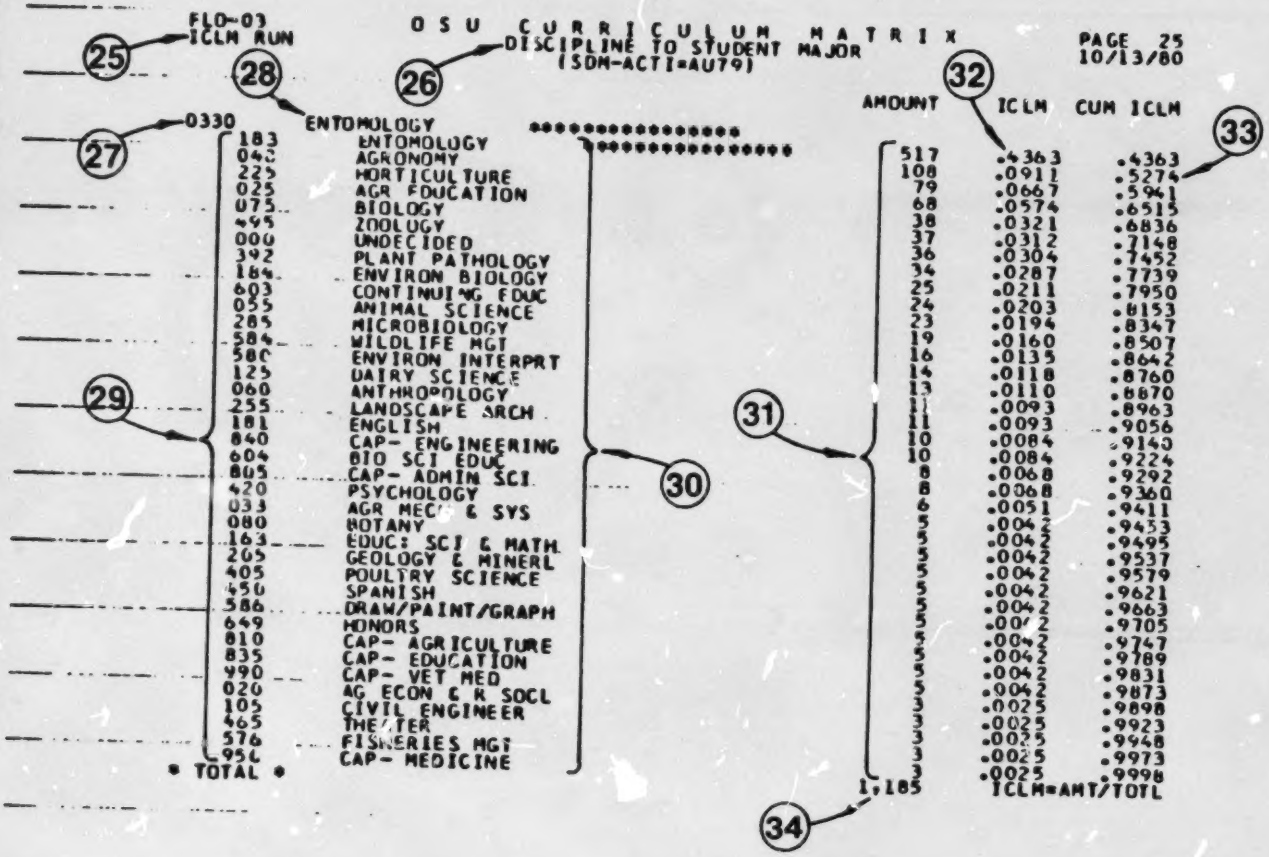
23
0722 ECONOMICS 1,452 .4740 .4740
1614 ACCOUNTING 182 .0594 .5334
1043 MANAGEMENT SCI 133 .0434 .5768
0537 ENGLISH 116 .0379 .6147
0584 ROMANCE LANGUAGE 116 .0379 .6526
0671 MATH 116 .0379 .6905
0557 HISTORY 95 .0310 .7215
1635 FINANCE 84 .0274 .7489
1435 COMPUTER INF SCI 54 .0176 .7665
0684 PHYSICS 50 .0163 .7828
0733 GEOGRAPHY 50 .0163 .7991
0694 STATISTICS 44 .0144 .8135
0614 ASTRONOMY 40 .0131 .8266
1050 MARKETING 36 .0118 .8384
0755 POLITICAL SCI 35 .0114 .8498
0509 CLASSICS 30 .0098 .8596
1265 HEALTH PHYS EDUC 28 .0091 .8687
0766 PSYCHOLOGY 26 .0085 .8772
03C6 BIOLOGICAL SCI 25 .0082 .8854
0547 GERMAN 25 .0082 .8936
0575 PHILOSOPHY 25 .0082 .9018
0711 ANTHROPOLOGY 25 .0082 .9100
0777 SOCIOLOGY 23 .0075 .9175
0708 COMMUNICATION 23 .0075 .9250
1000 COL OF ADM SCI 22 .0072 .9322
0280 THEATRE 20 .0065 .9387
0971 NEWARK CAMPUS 18 .0059 .9446
0502 BLACK STUDIES 15 .0049 .9495
0543 SLAVIC LANGUAGES 15 .0049 .9544
1465 INDUST SYSTM ENG 14 .0046 .9590
C956 MARION CAMPUS 13 .0042 .9632
0554 HEBREW 10 .0033 .9665
0656 GEOLOGY & MINERL 10 .0033 .9698
0628 CHEMISTRY 9 .0029 .9727
1485 PHOTO & CINEMA 8 .0026 .9753
1415 AVIATION 6 .0020 .9773
2580 PREVENTIVE MED 6 .0020 .9793
4470 MILITARY SCIENCE 6 .0020 .9813
0310 BIOCHEMISTRY 5 .0016 .9829
0350 MICROBIOLOGY 5 .0016 .9845
0360 BOTANY 5 .0016 .9861
0390 ZOOLOGY 5 .0016 .9877
0518 COMPARATIVE LANG 5 .0016 .9893
6600 MATH & PHYS SCI 5 .0016 .9909
1114 AGRI ECONOMICS 5 .0016 .9925
3020 HERSHON CENTER 5 .0016 .9941
4235 INTERNTL STUDIES 5 .0016 .9957
0262 MUSIC 4 .0013 .9970
6215 ART 3 .0010 .9980
1220 EDUCATION ADM 3 .0010 .9990
1230 EXCEPTL CHILDREN 3 .0010 1.0000
• TOTAL • 3,063.00=ENRL 3,063 ICLM=AMT/ENRL

FIGURE 9


FLO-03
ICLM RUN
25
O S U C U R R I C U L U M M A T R I X
DISCIPLINE TO STUDENT MAJOR
(SDM-ACTI=AU79)
26
PAGE 25
10/13/80
28
32
AMOUNT
ICLM
CUM ICLM
33
0330
ENTOMOLOGY
27
183 ENTOMOLOGY
040 AGRONOMY
225 HORTICULTURE
025 AGR EDUCATION
075 BIOLOGY
495 ZOOLOGY
000 UNDECIDED
392 PLANT PATHOLOGY
184 ENVIRON BIOLOGY
603 CONTINUING EDUC
055 ANIMAL SCIENCE
285 MICROBIOLOGY
584 WILDLIFE MGT
580 ENVIRON INTERPRT
125 DAIRY SCIENCE
060 ANTHROPOLOGY
29
255 LANDSCAPE ARCH
181 ENGLISH
840 CAP- ENGINEERING
604 BIO SCI EDUC
805 CAP- ADMIN SCI
420 PSYCHOLOGY
033 AGR MECH & SYS
080 BOTANY
163 EDUC: SCI & MATH
205 GEOLOGY & MINERL
405 POULTRY SCIENCE
450 SPANISH
586 DRAW/PAINT/GRAPH
649 HONORS
810 CAP- AGRICULTURE
835 CAP- EDUCATION
490 CAP- VET MED
020 AG ECON & R SOCL
105 CIVIL ENGINEER
465 THEATER
576 FISHERIES MGT
954 CAP- MEDICINE
30
31
517 .4363 .4363
108 .0911 .5274
79 .0667 .5941
68 .0574 .6515
38 .0321 .6836
37 .0312 .7148
36 .0304 .7452
34 .0287 .7739
25 .0211 .7950
24 .0203 .8153
23 .0194 .8347
19 .0160 .8507
16 .0135 .8642
14 .0118 .8760
13 .0110 .8870
11 .0093 .8963
11 .0093 .9056
10 .0084 .9140
10 .0084 .9224
8 .0068 .9292
8 .0068 .9360
6 .0051 .9411
5 .0042 .9453
5 .0042 .9495
5 .0042 .9537
5 .0042 .9579
5 .0042 .9621
5 .0042 .9663
5 .0042 .9705
5 .0042 .9747
5 .0042 .9789
5 .0042 .9831
5 .0042 .9873
3 .0025 .9898
3 .0025 .9923
3 .0025 .9948
3 .0025 .9973
3 .0025 .9998
* TOTAL *
1,185
ICLM=AMT/TOTL
34